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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : **Confirmation No. 4491**  
Toshiyuki KAWAGUCHI et al. : Docket No. 2003-0407A  
Serial No. 10/603,762 : Group Art Unit 2832  
Filed June 26, 2003 : Examiner Marina Fishman

PUSH-BUTTON SWITCH MEMBER AND  
MANUFACTURING METHOD OF SAME

THE COMMISSIONER IS AUTHORIZED  
TO CHARGE ANY DEFICIENCY IN THE  
FEES FOR THIS PAPER TO DEPOSIT  
ACCOUNT NO. 23-0975

**REQUEST FOR RECONSIDERATION**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE UNDER 37.CFR 1.116**  
**EXPEDITED PROCEDURE**  
**EXAMINING GROUP 2832**

Sir:

Responsive to the final Office Action dated July 28, 2004, the Applicants respectfully request reexamination and reconsideration of the application in view of the following remarks.

In item 2 on page 2 of the Office Action, claims 19, 22, 29, 32-33, 36, 43 and 45 were rejected under 35 U.S.C. § 102(b) as being anticipated by Tanabe (U.S. 5,871,088). This rejection is respectfully traversed for the following reasons.

Claims 19 and 33 each recite a push-button switch member comprising a transparent electrode which is disposed so as to oppose the base electrode and to contact with the display section. The transparent electrode, as recited in claims 19 and 33, is continuously and integrally formed in a range including and between a side surface and an upper surface of the key-top portion. Further, as recited in claims 19 and 33, the transparent electrode comprises a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline.

Tanabe discloses an EL sheet diaphragm which includes an illuminatable diaphragm portion 2. The diaphragm portion 2 includes a transparent electrode layer 4. The transparent

electrode layer 4 is formed in a surface of polyethylene terephthalate (PET) film 3, which is sequentially laminated by a light emitting layer 5, a dielectric layer 6, a rear electrode layer 7 and an insulating layer 8 (see Column 2, lines 44-58 and Figure 2). Accordingly, Tanabe discloses that the transparent electrode 4 is formed from a conductive polymer of PET.

In rejecting claims 19 and 33, the Examiner asserted that by disclosing a transparent electrode 4 which is formed from a conductive polymer of PET, Tanabe discloses a transparent conductive polymer consisting of polythiophene. In particular, at the top of page of page 3 of the Office Action, the Examiner asserted that “it is well known polyethylene is a specie[s] of polythiophene.” To support this assertion, the Examiner cited Saito et al. (U.S. 6,595,653) as “indicat[ing] that polyethylene is [a] polythiophene species conductive polymer” (see top of page 7 of the Office Action). Accordingly, based on the Examiner’s interpretation of the disclosure of Saito et al., the Examiner concluded that polyethylene is a species of polythiophene.

However, the Applicants respectfully disagree with the Examiner’s interpretation of Saito et al. Saito et al. discloses that the transparent conductive film 2 is not limited to vapor-depositing ITO (indium-tin oxide) on PET (polyethylene terephthalate). Alternatively, Saito et al. discloses that the transparent conductive film 2 may be a conductive polymer instead of vapor-depositing ITO on PET. If the transparent conductive film 2 is a conductive polymer, Saito discloses that a polythiophene species conductive polymer is preferable as the conductive polymer of the transparent conductive film 2. Saito et al. discloses that polyethylene dioxithiophene, not polyethylene, is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 (see Column 2, lines 50-59).

Accordingly, Saito et al. clearly does not disclose that polyethylene is a species of polythiophene. Instead, Saito et al. clearly discloses that polyethylene dioxithiophene, not polyethylene, is a species of polythiophene.

Despite this clear disclosure of Saito et al., the Examiner interpreted Saito et al. as “indicat[ing] that polyethylene is [a] polythiophene conductive polymer.” Notwithstanding the fact that Tanabe discloses a polyethylene terephthalate (PET) film 3, not a polyethylene film, and notwithstanding the fact that Saito et al. discloses that polyethylene dioxithiophene, not

polyethylene, is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 of Saito et al., the Examiner asserted that the “polyethylene” disclosed in Tanabe anticipates the transparent conductive polymer consisting of polythiophene of the present invention.

However, regardless of whether Tanabe is interpreted as disclosing a polyethylene film or a polyethylene terephthalate film, the Applicants strongly disagree with the Examiner’s assertion that polyethylene is a species of polythiophene.

Contrary to the Examiner’s assertion, neither polyethylene nor polyethylene terephthalate are species of polythiophene.

Initially, the Applicants respectfully submit that it is improper for the Examiner to selectively remove compounds from the materials which are disclosed in Saito et al. in order to arrive at the compounds recited in claims 19 and 33. As described above, Saito et al. discloses that polyethylene dioxithiophene, not “polyethylene,” is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 (see Column 2, lines 50-59).

Polyethylene, a simple polymer, is composed of chains of repeating  $-CH_2-$  units (see page 1204 of Appendix submitted herewith). Polyethylene terephthalate (PET) is a fiber forming polyesters which are prepared from terephthalic acid or its esters. PET is a condensation polymer which is produced from the monomers ethylene glycol,  $HOCH_2CH_2OH$ , a dialcohol, and dimethyl terephthalate,  $CH_3O_2C-C_6H_4-CO_2CH_3$ , a diester (see pages 1204-1205 of Appendix).

On the other hand, polythiophene is composed of repeating units of  $-C_4H_4S-$  (thiophene) (see page 1473 of Appendix). Accordingly, thiophene (polythiophene), as shown on page 1473 of Appendix, clearly requires a sulfur (S) group in its composition. Polyethylene dioxithiophene, which, as correctly described in Saito et al., is a species of thiophene. Polyethylene dioxithiophene, however, is only a species of thiophene (polythiophene) because polyethylene dioxithiophene includes dioxithiophene.

However, neither polyethylene nor PET includes a thiophene group. Therefore, neither polyethylene nor PET are a species of thiophene or polythiophene.

Therefore, even with the disclosure of Saito et al., Tanabe clearly does not disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Accordingly, claims 19 and 33 are clearly not anticipated by Tanabe since Tanabe fails to disclose or suggest each and every limitation recited in claims 19 and 33.

In item 4 on page 3 of the Office Action, claims 20-21 and 34-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanabe. As described above, Tanabe clearly does not disclose or suggest each and every limitation of claims 19 and 33. Therefore, Tanabe also fails to disclose or suggest the limitations recited in claims 20-21 and 34-35 which depend from claims 19 and 33, respectively.

In item 5 on page 4 of the Office Action, claims 23-28, 30-31, 37-42 and 44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanabe in view of Lemarchand et al. (EP 0,981,144). The Applicants will hereinafter refer to U.S. 6,416,196 to Lemarchand et al. (hereinafter "Lemarchand et al.") in the following remarks since Lemarchand et al. is an English language translation of EP 0,981,144.

As described above, Tanabe clearly does not disclose or suggest each and every limitation of claims 19 and 33. For the following reasons, the Applicants respectfully submit that Lemarchand et al. does not cure the deficiencies of Tanabe for failing to disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Lemarchand et al. discloses a push-button switch member 1 which uses a transparent conducting ink (ITO) for the transparent electrode 6 (see Column 3, lines 24-45). Further, Lemarchand et al. also discloses that a conducting track 213 is made of the conducting ink (see Column 5, lines 26-28). Accordingly, Lemarchand et al., similar to Tanabe, also clearly does not disclose or suggest a transparent electrode comprising a transparent conductive polymer which is

selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Therefore, neither Tanabe nor Lemarchand et al., either individually or in combination, disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Accordingly, no obvious combination of Tanabe and Lemarchand et al. would result in the inventions of claims 19 and 33 since neither Tanabe nor Lemarchand et al., either individually or in combination, disclose or suggest each and every limitation of claims 19 and 33.

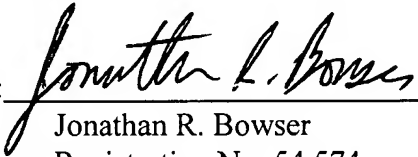
Furthermore, because of the clear distinctions discussed above, the Applicants respectfully submit that no obvious combination of Lemarchand et al. and Tanabe would result in the inventions of new claims 19 and 33 since Lemarchand et al. and Tanabe each fail to disclose or suggest each and every limitation of new claims 19 and 33. Furthermore, it is submitted that the clear distinctions discussed above are such that a person having ordinary skill in the art at the time the invention was made would not have been motivated to modify Tanabe and Lemarchand et al. in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 19 and 33. Therefore, it is submitted that claims 19 and 33, as well as claims 20-32 and 34-45 which depend therefrom, are clearly allowable over the prior art as applied by the Examiner.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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September 27, 2004

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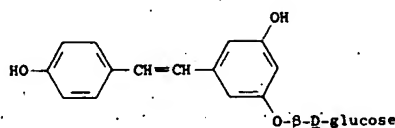
1989

Cl/molecule: 6.30.  $d_4^{20}$  1.555;  $d_4^{25}$  1.566. Distillation range 385-420. No open cup flash point to boiling.  $n_D^{20}$  1.647-1.649. Dielectric constant (1000 cycles) 4.3 (25°); 3.7 (100°).  $LD_{50}$  orally in weanling rats: 1315 mg/kg (Kimbrough).

**Caution:** Toxic effects in humans include chloracne, pigmentation of skin and nails, excessive eye discharge, swelling of eyelids, distinctive hair follicles, gastrointestinal disturbances. In Japan, accidental contamination of rice bran oil with Kanechlor 400 led to an outbreak of what became known as "Yusho disease", see M. Kuratsune *et al.*, in EPA-560/6-75-004, *loc. cit.*, p 14. Toxic symptoms in animals include hepatocellular carcinoma, hypertrophy of the liver, adenofibrosis, weight and hair loss, mouth and eyelid edema, acneform lesions, decreased hemoglobin + hematocrit, gastric mucosal ulceration and reduced ability to reproduce. These substances may reasonably be anticipated to be carcinogens: *Fourth Annual Report on Carcinogens* (NTP 85-002, 1985) p 170.

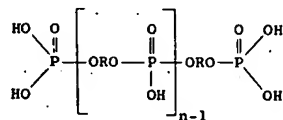
**USE:** In electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines. Formerly used in U.S. as hydraulic fluids, plasticizers, adhesives, fire retardants, wax extenders, dedusting agents, pesticide extenders, inks, lubricants, cutting oils, in heat transfer systems, carbonless reproducing paper.

**7542. Polydatin.** 3-Hydroxy-5-[2-(4-hydroxyphenyl)ethyl]phenyl- $\beta$ -D-glucopyranoside; 3-hydroxy-5-(p-hydroxystyryl)phenyl glucoside; 3,4',5'-trihydroxystilbene-3- $\beta$ -D-glucoside; resveratrol-3- $\beta$ -mono-D-glucoside; piceid.  $C_{20}H_{22}O_8$ ; mol wt 390.40. C 61.53%, H 5.68%, O 32.79%. Isolated from fresh root of *Polygonum cuspidatum* Sieb. & Zucc., Polygonaceae, and structure: Nonomura *et al.*, *Yakugaku Zasshi* 83, 988 (1963).



Trihydrate, crystals, mp 225-226°.  $[\alpha]_D^{25}$  -74.9° (c = 1.709 in ethanol).

**7543. Polyestradiol Phosphate.** Estradiol, phosphate polymer; PEP; Estradurin. Polymeric ester of phosphoric acid and estradiol. Mol wt ~26,000. Prep: Diczfalusy, *Endocrinology* 54, 471 (1954); Diczfalusy *et al.*, U.S. pat. 2,928,849 (1960 to AB Leo); Fernö *et al.*, *Acta Chem. Scand.* 12, 1675 (1958). Proposed structure: Fernö *et al.*, *loc. cit.*

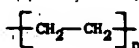


(—ORO— is the estradiol radical and n is about 80)

Solid, mp 195-202°. Very sol in aq pyridine; sol in aq alkali; very slightly sol in ethanol, ethanol + water (1:1), water, dioxane, acetone, chloroform. Intrinsic viscosity  $[\eta]$  in 0.25M NaCl soln at pH 7.5 = 0.04.

**THERAP CAT:** Estrogen (used in prostatic carcinoma).

**7544. Polyethylene.** Ethene homopolymer; Agilene; Alathon; Alkathene; Courlenc; Lüpolen; Platilon; Polythene; Pylon; Reevon. Mol wt about 1500-100,000. C 85.7%, H 14.3%. Prep'd by polymerization of liq ethylene at high temps and high or low pressure. Reviews: Aggarwal, *Sweeting, Chem. Rev.* 57, 665-742 (1957); Raff, Allison, *Polyethylene*, vol. XI of *High Polymers* series (Interscience, New York, 1956); Faith *et al.*, *Industrial Chemicals* (Wiley, New York, 3rd ed., 1965) pp 624-630.



Plastic solid of milky transparency.  $d_4^{20}$  0.92. Tough and flexible at room temps, mp 85-110°. Breaks with cryst fracture at -50°. Good electrical insulator. Surface resistivity:  $10^{14}$  ohms. Will burn, but hardly supports combustion. Stable to water, non-oxidizing acids and alkalis, alcohols, ethers, ketones, esters at ordinary temps. Attacked by oxidizing acids such as nitric acid and perchloric acid, free halogens, benzene, petr ether, gasoline and lubricating oils, aromatic and chlorinated hydrocarbons.

**USE:** Laboratory tubing; in making prostheses; electrical insulation; packaging materials; kitchenware; tank and pipe linings; paper coatings; textile stiffeners.

**7545. Polyethylene Glycol.**  $\alpha$ -Hydro- $\omega$ -hydroxypoly(oxy-1,2-ethanedyl); macrogol; PEG; Carbowax; Jeffox; Nycoline; Pluracol E; Poly-G; Polyglycol E; Solbase. Liquid and solid polymers of the general formula  $H(OCH_2CH_2)_nOH$ , where n is greater than or equal to 4. In general, each PEG is followed by a number which corresponds to its average mol wt. Synthesis: Fordyce, Hibbert, *J. Am. Chem. Soc.* 61, 1905, 1910 (1939). Reviews: Glycols, G. O. Curme, Jr., F. Johnston, Eds., A.C.S. Monograph Series no. 114 (Reinhold, New York, 1952) pp 176-202; Kastens in *High Polymers*, H. Mark *et al.*, Eds., vol. 13 entitled *Polyethers*, part 1 (Interscience, New York, 1963) pp 169-189, 274-291; G. M. Powell, III in *Handbook of Water-Soluble Gums & Resins*, R. L. Davidson, Ed. (McGraw-Hill, New York, 1980) pp 181-183/31.

Clear, viscous liquids or white solids which dissolve in water forming transparent solns. Sol in many organic solvents. Readily sol in aromatic hydrocarbons. Only slightly sol in aliphatic hydrocarbons. Do not hydrolyze or deteriorate on storage, will not support mold growth. Polyethylene glycols are compds of low toxicity: Smyth *et al.*, *J. Am. Pharm. Assoc., Sci. Ed.* 39, 349 (1950). Toxicity data (PEG 400): W. Bartsch *et al.*, *Arzneimittel-Forsch.* 26, 1581 (1976).

**Polyethylene glycol 200**, average value of n is 4, mol wt range 190-210. Viscous, hygroscopic liq; slight characteristic odor;  $d_4^{25}$  1.127. Viscosity (210°F): 4.3 centistokes. Supercools upon freezing.

**Polyethylene glycol 400**, average value of n between 8.2 and 9.1, mol wt range 380-420. Viscous, slightly hygroscopic liq; slight characteristic odor;  $d_4^{25}$  1.128. mp 4-8°. Viscosity (210°F): 7.3 centistokes.  $LD_{50}$  orally in rats: 30 ml/kg (Bartsch).

**Polyethylene glycol 600**, average value of n between 12.5 and 13.9, mol wt range 570-630. Viscous, slightly hygroscopic liq; characteristic odor;  $d_4^{25}$  1.128. mp 20-25°. Viscosity (210°F): 10.5 centistokes.

**Polyethylene glycol 1500**, average value of n between 29 and 36, mol wt range 1300-1600. White, free-flowing powder;  $d_4^{25}$  1.210. mp 44-48°. Viscosity (210°F): 25-32 centistokes.

**Polyethylene glycol 4000**, average value of n between 68 and 84, mol wt range 3000-3700. White, free-flowing powder or creamy-white flakes;  $d_4^{25}$  1.212. mp 54-58°. Viscosity (210°F): 76-110 centistokes.  $LD_{50}$  orally in rats (divided doses): 59 g/kg (Smyth).

**Polyethylene glycol 6000**, average value of n between 158 and 204, mol wt range 7000-9000. Powder or creamy-white flakes;  $d_4^{25}$  1.21. mp 56-63°. Viscosity (210°F): 470-900 centistokes.  $LD_{50}$  orally in rats: > 50 g/kg (Smyth).

**USE:** As water-soluble lubricants for rubber molds, textile fibers, and metal-forming operations. In food and food packaging. In hair preps, in cosmetics in general. Pharmaceutical aid (ointment and suppository base). As a stationary phase in gas chromatography. Also in water paints, paper coatings, polishes and in the ceramics industry. **Caution:** Solvent action on some plastics!

**THERAP CAT (VET):** Ointment base.

**7546. Polyethylene Terephthalates.** PET. Fiber-forming polyesters prep'd from terephthalic acid, q.v. or its esters and ethylene glycol: Whinfield, Dickson, U.S. pat. 2,465,319 (1949 to du Pont). Review of structures, definition of trade names: R. W. Moncrieff, *Man-Made Fibres* (John Wiley & Sons, New York, 4th ed., 1963) pp 361-389, 707-723.



y.  $d_4^{20}$  0.92. Tough and breaks with crystalline fracture. Surface resistivity supports combustion. Insoluble in acids and alkalis, alcohols, esters. Attacked by oxidizing agents, free line and lubricating oils, and solvents.

**Hydroxyhydroxypoly-EG:** Carbowax; Jeffox; Glycol E; Solbase. Linear formula  $H(OCH_2CH_2)_nOH$ ,  $n$  equal to 4. In general, which corresponds to its  $n$ . Hibbert, *J. Am. Chem. Soc.* 69: 169-189, 274-291; *Water-Soluble Gums*; Graw-Hill, New York.

Solids which dissolve in water in many organic solvents. Only slightly hydrolyzed or deteriorated growth. Polyethylene glycol. Smyth et al., *J. Am. Chem. Soc.* 79: 1581 (1957).  $n$  is 4, mol wt 1000. Slight characteristic (10°F): 4.3 centistokes.

Value of  $n$  between 8.2 and 12.5, slightly hygroscopic. Viscosity in rats: 30 ml/kg.

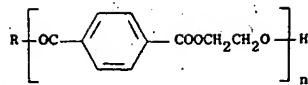
Value of  $n$  between 12.5 and 128. Viscosity (210°F): 25-32.

Value of  $n$  between 29 and 128. Viscosity (210°F): 25-32.

Value of  $n$  between 68 and 128. Viscosity (210°F): 25-32.

Value of  $n$  between 158 and 128. Viscosity (210°F): 470-900. 50 g/kg (Smyth). Insoluble in water, rubber molds, textile dyes. In food and food packaging. Pharmaceutics in general. Pharmaceuticals in water paints, paper industry. Caution:

**PET.** Fiber formic acid, q.v. or its esters. U.S. pat. 2,465,128. Structures, definition of *an-Made Fibres*. (John 963) pp 361-389, 707-



**R = OH, Dacron, Amilar, Fiber V.** Solid, dec at approx 250°. Sp gr 1.38. Sol in hot *m*-cresol, trifluoroacetic acid, *o*-chlorophenol, a mixture of 2 parts of trichlorophenol and 10 parts (by wt) of phenol, a mixture of 2 parts of tetrachloroethane and 3 parts (by wt) of phenol. Fiber has good resistance to weak acids even at boiling temp, to strong acids in the cold, to weak alkalis, to bleaches, to most alcohols, ketones, soaps, detergents, and dry cleaning agents. Fabric has good resistance to creasing, abrasion, heat aging, and sunlight when behind glass. When "heat-set", fabric will not shrink in either boiling water or boiling drycleaning solvent. Fabric burns, but local melting generally prevents spread of fire. Insects cannot thrive on the fiber, but some can cut through it. Molds, mildew, and fungi may grow on applied finishes, but do not attack fiber.

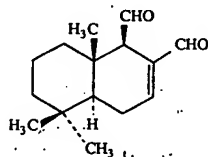
**R = OCH<sub>3</sub>, Terylene.** For physical properties, see Dacron above. Other similar products: Diolen, Enkalene, Fortrel, Tergal, Terital, Terlenka, Trevira, Mylar.

**USE:** In fabric manufacture; as films; as base for magnetic coatings. Surgical aid (arterial grafts).

**7547. Polyferose.** Jefron, An iron carbohydrate chelate containing approx 45% iron in which the metallic (Fe) ion is sequestered within a polymerized carbohydrate derived from sucrose.

**THERAP CAT:** Hematinic.

**7548. Polygodial.**  $[1R-(1\alpha,4\alpha\beta,8\alpha\alpha)]-1,4,4a,5,6,7,8,8a$ -Octahydro-5,5,8a-trimethyl-1,2-naphthalenedicarboxaldehyde; tadeonal.  $C_{19}H_{26}O_2$ ; mol wt 234.34. C 76.88%, H 9.46%, O 13.66%. Widely distributed drimane sesquiterpene with insect antifeedant properties; naturally occurring as the (±)-form. Isolated from *Polygonum hydropiper* L., *Polygonaceae* (Australia) and structure: C. S. Barnes, J. W. Loder, *Aust. J. Chem.* 15, 322 (1962); from the bark of *Warburgia stuhlmanni* Engl. or *W. ugandensis*, *Canellaceae* (E. Africa): I. Kubo et al., *Chem. Commun.* 1976, 1013; from nudibranch *Dendrodoris limbata* (Mediterranean): G. Cimino et al., *Science* 219, 1237 (1983); from nudibranch *D. nigra*, *D. tuberculosa* (Hawaii) and *D. krebsii* (Mexico): R. K. Okuda et al., *J. Org. Chem.* 48, 1866 (1983). Relationship between structure and antifeedant activity: K. Nakanishi, I. Kubo, *Isr. J. Chem.* 16, 28 (1977); M. D'Ischia et al., *Tetrahedron Letters* 1982, 3295. Partial synthesis: M. J. Cortes et al., *Chem. & Ind. (London)* 1985, 735. Synthesis of (±)-form: T. Kato et al., *Tetrahedron Letters* 1971, 1961; S. P. Tanis, K. Nakanishi, *J. Am. Chem. Soc.* 101, 4398 (1979); M. Jalali-Naini et al., *Tetrahedron Letters* 1981, 2995; S. C. Howell et al., *Chem. Commun.* 1981, 507.



Colorless needles from petroleum (40-60°), mp 57° (Barnes, Loder).  $[\alpha]_D^{25} -131^\circ$  ( $c = 0.96$  in ethanol). uv max (ethanol): 231, 295 nm ( $\epsilon$  11800, 76).

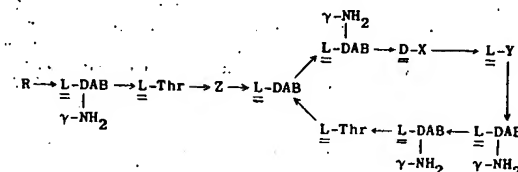
(±)-Form, mp 93-94° (Tanis, Nakanishi).

**7549. Polylysine.** A lysine polypeptide or homopolymer, the chain length of which varies with the method of prep. Prep: Katchalski et al., *J. Am. Chem. Soc.* 69, 2564 (1947); 70, 2094 (1948); Fasman et al., *ibid.* 83, 709 (1961); Sela et al., *Biopolymers* 1, 517 (1963); Strojny, White, U.S. pat. 3,215,684 (1965 to Dow).



**L-Form hydriodide**, average dp (or  $n$ ) = 32. Transparent, solid, film-like polymer. Readily sol in water; practically insol in the usual organic solvents. Transition of high-mol-wt poly-L-lysine (dp 1500) in aq soln from a helical to a randomly coiled conformation under the influence of decreasing pH or increasing temp: Applequist, Doty, *C.A.* 58, 6925b (1963).

**7550. Polymyxin.** Antibiotic complex produced by *Bacillus polymyxa*: Brownlee, Jones, *Biochem. J.* 43, XXV (1948). Prep: Ainsworth, Pope, U.S. pat. 2,565,057 (1951 to Burroughs-Wellcome); Petty, U.S. pat. 2,595,605 (1952 to Am. Cyanamid); Benedict, Stodola, U.S. pat. 2,771,397 (1956 to USDA). Purification: Hastings et al., *Brit. pat.* 782,926 (1957 to Distillers Co.). Polymyxins A, B, C, D, E, F, K, M, P, S and T have been identified. Isolation of polymyxins A, B, C and E: Few, Schulman, *Biochem. J.* 54, 171 (1953); of polymyxin D: Stanley et al., *Bull. Johns Hopkins Hosp.* 81, 43 (1947); of polymyxin F: W. L. Parker et al., *J. Antibiot.* 30, 767 (1977); of polymyxin K: Kimura, Japan, pat. 16,152(71), C.A. 75, 62180r (1971); of polymyxin M: Khokhlov et al., C.A. 55, 5653h (1961); of polymyxin P: Kimura et al., *J. Antibiot.* 22, 449 (1969); of polymyxin S<sub>1</sub> and polymyxin T<sub>1</sub>: J. Shoji et al., *ibid.* 30, 1029 (1977). Resolution of polymyxin B into B<sub>1</sub> and B<sub>2</sub>: Hausmann, Craig, *J. Am. Chem. Soc.* 76, 4892 (1954). Structure and synthesis of polymyxin B<sub>1</sub>: Wilkinson, Lowe, *Nature* 202, 1211 (1964); Vogler et al., *Helv. Chim. Acta* 48, 1161 (1965). Structure of polymyxin B<sub>2</sub>: Wilkinson, Lowe, *Nature* 204, 993 (1964). Separation of polymyxin D into D<sub>1</sub> and D<sub>2</sub> and structures: Hayashi et al., *Experientia* 22, 354 (1966). Structure of polymyxin S<sub>1</sub>: J. Shoji et al., *J. Antibiot.* 30, 1035 (1977); of polymyxin T<sub>1</sub>: *idem*, *ibid.* 1042. Review: Vogler, Studer, *Experientia* 22, 345-354 (1966); Paulus, "Polymyxins" in *Antibiotics II*, D. Gottlieb, P. Shaw, Eds. (Springer-Verlag, New York, 1967) pp 254-267.



DAB =  $\alpha,\gamma$ -diaminobutyric acid

Obtained as the hydrochloride. Nearly colorless powder, dec 228-230°.  $[\alpha]_D^{25} -40^\circ$  ( $c = 1.05$ ). The hydrochloride is very sol (more than 40%) in water and methanol. The sol decreases in the higher alcs. Practically insol in the usual ethers, esters, ketones, hydrocarbons, and the chlorinated solvents. Forms water insol salts with a number of ppts such as picric acid, helianthic acid, Reinecke salt. The free base is slightly sol in water; almost insol in alc.

**Polymyxin B.** Mixture of polymyxins B<sub>1</sub> and B<sub>2</sub>.  $[\alpha]_{5461} -106.3^\circ$  (1N HCl).

**Polymyxin B sulfate, Aerosporin.** Solubilities: Weiss et al., *Antibiot. & Chemother.* 7, 374 (1957). Mixture with trimethoprim, *Polytrim*.

**Polymyxin B<sub>1</sub>.**  $C_{56}H_{98}N_{16}O_{13}$ . R = (+)-6-methyloctanoyl; X = phenylalanine; Y = leucine; Z = L-DAB.

**Polymyxin B<sub>2</sub> pentahydrochloride.**  $C_{56}H_{103}Cl_5N_{16}O_{13}$ , white powder.  $[\alpha]_D^{25} -85.11^\circ$  ( $c = 2.33$  in 75% ethanol).

**Polymyxin B<sub>2</sub>.**  $C_{55}H_{96}N_{16}O_{13}$ . R = 6-methylheptanoyl; X = phenylalanine; Y = leucine; Z = L-DAB.  $[\alpha]_{5461} -112.4^\circ$  (2% acetic acid).

**Polymyxin D<sub>1</sub>.**  $C_{50}H_{93}N_{15}O_{15}$ . R = (+)-6-methyloctanoyl; X = leucine; Y = threonine; Z = D-serine.

**Polymyxin D<sub>2</sub>.**  $C_{49}H_{91}N_{15}O_{15}$ . R = 6-methylheptanoyl; X = leucine; Y = threonine; Z = D-serine.

is been used as cata-  
thyl ether with male-

mol wt 207.90. Br  
Prepd from thionyl  
n, *Compt. Rend.* 122,  
ullman, *Inorg. Syn.* 1,

mp -52°. bp<sub>775</sub> 138°;  
hionyl chloride. Dec  
bottles. Hydrolyzed  
roform, carbon tetra-

eyes, mucous mem-

oxychloride. Cl<sub>2</sub>O<sub>8</sub>;  
%, S 26.95%. SOCl<sub>2</sub>,  
r dichloride with sul-  
(1893); Edwards, U.S.  
rochemical); Fehér in  
*Chemistry*, vol. 1, G.  
ork, 2nd ed., 1963 pp  
nds" in Kirk-Othmer  
vol. 19 (Interscience,  
l. Purification by dis-  
ed oil: Martin, Fieser,  
Alternate methods of  
*Soc.* 68, 1380 (1946);  
ats. 3,155,457; 3,156,-  
Friedman, Wetter, J.

sh, fuming, refractive  
° 1.655; d<sub>4</sub><sup>20</sup> 1.638. mp  
517. Dec when heated  
Cl<sub>2</sub>. Hydrolyzed by  
; with benzene, chloro-

strongly irritating and  
s and eyes.

to replace OH or SH  
with Grignard reagents  
view of use in organic  
nts, vol. 1 (John Wiley,

diffuoride. F<sub>2</sub>O<sub>8</sub>; mol  
7.26%. SOF<sub>2</sub>. Usually  
uoride on thionyl chlo-  
pentafluoride: Booth,  
(1940); Smith, Muetter-  
also be prepared by the  
yl chloride: Kemmitt,  
3-229 (1965).

Does not attack glass.  
cylinders. mp -129.5°.  
-100° 1.780. d (solid);  
.6. Very slowly hydro-  
benzene.

; respiratory tract.

thyldihydro-5-(1-methyl-  
dinedione monosodium  
barbituric acid sodium  
arbitral sodium; thiopen-  
thal Sodium; Nesdonal  
; Thiothal Sodium. C<sub>11</sub>  
; 49.98%, H 6.48%, N  
13%. Prepn: U.S. pats.  
Prepn of nonhydroscopic  
0,001 (1963 to Abbott).  
*Toxicol. Appl. Pharmacol.*

Yellowish-white, hygroscopic powder. Alliaceous, garlic-  
like odor. Sol in water, alcohol. Insol in ether, benzene;  
petr ether. Aq solns are alkaline to litmus. Solns dec on  
standing; on boiling precipitation occurs. LD<sub>50</sub> in mice  
(mg/kg): 149 i.p.; 78 i.v. (Christensen; Lee).

Note: Sterile Thiopental Sodium is a mixture of sterilized  
thiopental sodium (91.7%) with anhydrous sodium carbonate as  
a buffer. A 2.5% w/v soln in water is strongly alkaline,  
having a pH of about 10.5.

Caution: May be habit forming. This is a controlled sub-  
stance (depressant) listed in the U.S. Code of Federal Re-  
gulations, Title 21 Parts 329.1 and 1308.13 (1987).

THERAP CAT: Anesthetic (intravenous).

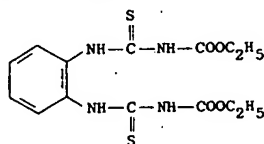
THERAP CAT (VET): Short-acting anesthetic.

**9281. Thiopeptin. Thiofeed.** Sulfur containing peptide  
antibiotic complex produced by *Streptomyces tateyamensis*  
no. 7906: Miyairi *et al.*, Ger. pat. 1,929,355 (1969 to Fuji-  
sawa), C.A. 72, 88921w (1970). Consists of the a and b se-  
ries of thiopeptins A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, A<sub>4</sub>, and B (major component).  
Structurally similar to thiostrepton, q.v. Biological and  
chemical studies: Miyairi *et al.*, *Antimicrob. Ag. Chemother.*  
1, 192 (1972). Characterization of thiopeptins B: Miyairi *et al.*,  
*J. Antibiot.* 23, 113 (1970); structural studies: Muramat-  
su *et al.*, *ibid.* 25, 537 (1972); 30, 383 (1977). Total struc-  
tures of components: O. D. Hensens, G. Albers-Schönberg,  
*Tetrahedron Letters* 1978, 3649.

Thiopeptins B, faint yellow crystals, mp 219-222° (dec).  
[α]<sub>D</sub><sup>25</sup> -80° (c = 1 in chloroform). uv spectrum (methanol):  
shoulders at 230-250, 295, 305 nm. Sol in dioxane, DMSO,  
DMF, pyridine, chloroform. Insol in ether, benzene, n-hex-  
ane, petr ether, water. Fairly sol in methanol, acetone, ethyl  
acetate.

THERAP CAT (VET): Antibiotic feed additive.

**9282. Thiophanate.** [1,2-Phenylenebis(iminocarbon-  
thioyl)]bis(carbamic acid diethyl ester; 4,4'-o-phenylenebis[3-  
thioallophanic acid]diethyl ester; 1,2-bis(3-ethoxycarbonyl-  
2-thioureido)benzene; Cercobin; Topsin; Nemafox. C<sub>14</sub>H<sub>18</sub>  
N<sub>4</sub>O<sub>8</sub>S<sub>2</sub>; mol wt 370.44. C 45.39%, H 4.90%, N 15.12%, O  
17.28%, S 17.31%. Prepn: Noguchi *et al.*, Ger. pat. 1,806,-  
123 (1969 to Nippon Soda Co.), C.A. 71, 70347h (1969),  
corresp to U.S. pats. 3,745,187 and 3,769,308 (both 1973).  
Photodegradation: H. Buchenauer *et al.*, *Pestic. Sci.* 5, 343  
(1973). Activity against nematode infection in ruminants:  
Eichler, *Brit. Vet. J.* 129, 533 (1973). Toxicological studies  
in animals: *idem*, *ibid.* 130, 570 (1974).



Colorless plates, mp 195°. LD<sub>50</sub> orally in mice and rats:  
> 15 g/kg (Eichler).

O,O-Dimethyl analog, C<sub>12</sub>H<sub>14</sub>N<sub>4</sub>O<sub>8</sub>S<sub>2</sub>, *thiophanate-methyl*,  
*Cercobin-M*, *Topsin-M*. See above for prepn. Persistence in  
soil: J. R. Flecker *et al.*, *J. Agr. Food Chem.* 22, 592 (1974).  
Pharmacological properties: Hashimoto *et al.*, *Toxicol. Appl.*  
*Pharmacol.* 23, 616 (1972). Toxicity data: *idem*, *ibid.* 606.  
Colorless prisms, mp 181.5-182.5°. Sol in acetone, metha-  
nol, chloroform, acetonitrile. Slightly sol in other organics;  
insol in water. LD<sub>50</sub> in rats, mice, guinea pigs, rabbits  
(g/kg): 3.40, 6.64, 3.64, 2.27 orally (Hashimoto).

USE: Systemic fungicide.

THERAP CAT (VET): Anthelmintic.

**9283. Thiophene.** Thiofuran; thiofurfuran; thiole; thio-  
tetrole; divinylene sulfide. C<sub>4</sub>H<sub>4</sub>S; mol wt 84.14. C 57.10%,  
H 4.79%, S 38.11%. Found in coal tar; in coal gas, and in  
technical benzene: V. Meyer, *Ber.* 16, 1471 (1883); 17, 2642  
(1884). Made available in commercial quantities by a pro-  
cess utilizing the dehydrogenation of butane with sulfur as  
the dehydrogenating agent, followed by cyclization with  
sulfur to form the thiophene ring: Rasmussen, Ray, *Chem.*  
*Inds.* 60, 593, 620 (1947). Laboratory prepn by heating  
sodium succinate with phosphorus trisulfide: R. Phillips,  
*Org. Syn. coll. vol. II*, 578 (1943). Also prepd by passing

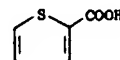
ethylene or acetylene into boiling sulfur; or by passing acet-  
ylene and hydrogen sulfide over hot bauxite or nickel hy-  
droxide: U.S. pat. 1,421,743, C.A. 16, 3093 (1922). Review:  
B. Buchholz in Kirk-Othmer *Encyclopedia of Chemical*  
*Technology* vol. 22 (Wiley-Interscience, New York, 3rd ed.,  
1983) pp 965-973.



Liquid. Slight aromatic odor resembling that of benzene.  
d<sub>4</sub><sup>20</sup> 1.0873; d<sub>4</sub><sup>25</sup> 1.0573; d<sub>4</sub><sup>30</sup> 1.0285. mp -38.3°. bp<sub>760</sub> 84.4°;  
bp<sub>400</sub> 64.7°; bp<sub>200</sub> 46.5°; bp<sub>100</sub> 30.5°; bp<sub>60</sub> 20.1°; bp<sub>30</sub> 12.5°;  
bp<sub>20</sub> 0.0°; bp<sub>10</sub> -10.9°; bp<sub>5</sub> -20.8°; n<sub>D</sub><sup>20</sup> 1.52684. Absorption  
spectrum: Purvis, *J. Chem. Soc.* 97, 1653, 1656 (1910).  
Insol in water; miscible with most organic solvents. May be  
heated to 850° without decompn.

USE: Solvent similar to benzene, but suitable for lower and  
higher temps; manuf of resins from thiophene-phenol mix-  
tures and formaldehyde; manuf of dyes and pharmaceuticals.

**9284. 2-Thiophenecarboxylic Acid.** 2-Thenoic acid.  
C<sub>5</sub>H<sub>4</sub>O<sub>3</sub>S; mol wt 128.16. C 46.86%, H 3.14%, O 24.97%, S  
25.02%. Prepn: Voerman, *Rec. Trav. Chim.* 26, 293 (1907);  
Sy, de Malleray, *Bull. Soc. Chim. France* 1963, 1276; Gross  
*et al.*, *Ber.* 96, 1382 (1963).



Needles from water, mp 128.5°. Very sol in ether, alc, hot  
water; moderately sol in CHCl<sub>3</sub>; slightly sol in petr ether.

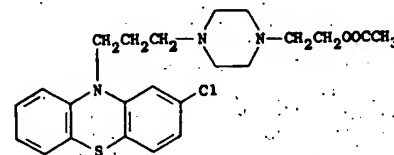
Sodium salt, C<sub>5</sub>H<sub>3</sub>NaO<sub>3</sub>S, *sodium 2-thiophenecarboxylate*,  
*sodium 2-thenoate*, *Trophires*.

USE: Sodium salt as lubricating-grease thickener, Morway,  
Kolfenbach, U.S. pat. 2,576,031 (1951 to Standard Oil).

**9285. Thiophenol.** *Benzenethiol*; phenylmercaptan.  
C<sub>6</sub>H<sub>5</sub>S; mol wt 110.17. C 65.41%, H 5.49%, S 29.12%. C<sub>6</sub>-  
H<sub>5</sub>SH. Prepd by the reduction of benzenesulfonyl chloride  
with zinc dust in sulfuric acid: Adams, Marvel, *Org. Syn.* 1,  
71 (1921).

Liquid. Repulsive, penetrating, garlic-like odor, esp when  
impure. d<sub>4</sub><sup>25</sup> 1.0728; bp<sub>760</sub> 168.3°; bp<sub>100</sub> 103.6°; bp<sub>50</sub> 86.2°; bp<sub>20</sub>  
69.7°; bp<sub>10</sub> 18.6°; n<sub>D</sub><sup>20</sup> 1.58603. Heat of fusion 24.90 cal/g;  
spec heat at 25°: 0.3829; entropy at 25°: 52.6. Insol in  
water. Very sol in alc; miscible with ether, benzene, CS<sub>2</sub>.  
Feebly acidic. Oxidizes in air, esp when dissolved in alco-  
holic ammonia, forming diphenyl disulfide, C<sub>6</sub>H<sub>5</sub>SSC<sub>6</sub>H<sub>5</sub>.  
The hydrogen of the SH group is easily replaced by metals.

**9286. Thiopropazate.** 4-[3-(2-Chlorophenothiazin-10-  
yl)propyl]-1-piperazineethanol acetate; 2-chloro-10-[3-[1-(2-  
acetoxyethyl)-4-piperazinyl]propyl]phenothiazine; 10-[3-[1-(2-  
acetoxyethyl)-4-piperazinyl]propyl]-2-chlorophenothiazine;  
N-(β-acetoxyethyl)-N'-(γ-(2-chloro-10'-phenothiazin-  
azinyl)propyl)piperazine; 1-(2-acetoxyethyl)-4-[3-(2-chloro-  
10-phenothiazinyl)propyl]piperazine. C<sub>27</sub>H<sub>30</sub>ClN<sub>4</sub>O<sub>4</sub>S;  
mol wt 446.00. C 61.93%, H 6.33%, Cl 7.95%, N 9.42%, O  
7.17%, S 7.19%. Prepd from 2-chloro-10-(γ-chloropropyl)-  
phenothiazine and piperazine in butanone followed by treat-  
ment with β-bromoethyl acetate in toluene: Cusic, U.S. pat.  
2,766,235 (1956); Anderson *et al.*, *Arzneimittel-Forsch.* 12,  
937 (1962).



Free base, bp<sub>0.1</sub> 214-218°. Sol in ether.  
Dihydrochloride, C<sub>27</sub>H<sub>30</sub>Cl<sub>2</sub>N<sub>4</sub>O<sub>4</sub>S, *Dartal*, *Dartalan*.  
Crystals from 95% ethanol, dec 223-229°. Freely sol in wa-  
ter; much less sol in alc, chloroform; almost insol in ether.

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